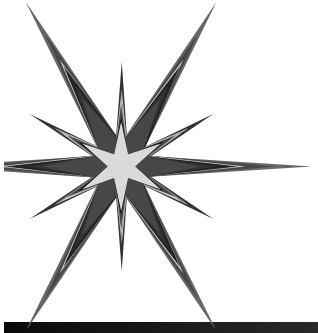

Research Opportunities in Advanced Research &Environmental Technologies

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Environment Product Line

ENVIRONMENTAL ISSUES

- Ozone Non-Attainment (NO_x)
- $PM_{2.5}$ (NO_x, SO_2)
- Acid Rain (NO_x, SO_2)
- Fine Particulates and Air Toxics (Mercury)
- Waste Management (CCBs)
- Climate Change (CO_2)

Environment Product Line

PRODUCTS

- Advanced Environmental Control Technologies
  - Retrofit
  - Advanced power systems
- Information for Policy and Decision Makers
  - Quality scientific data
  - Background on emerging issues

Environment Product Line

TECH. DEVELOPMENT OBJECTIVES

- **Nitrogen Oxides**
  - 70% to 90% reduction at 1/2 current costs
- **Mercury**
  - 90% reduction at 1/2 current cost of alternative technologies

Environment Product Line

OBJECTIVES (cont'd)

- **Coal Combustion Byproducts**
  - **Demonstrate high value and high volume uses of CCBs**
  - **Disposal or utilization of coal by-products is routine business practice**

Environment Product Line

OBJECTIVES (cont'd)

- **Carbon Dioxide**
  - **Develop low-cost options for capture, reuse, and sequestration of GHGs from fossil energy conversion systems**
  - **Develop technology options based on novel concepts to achieve near-zero GHG emissions from fossil fuels in the longer-term**

Environment Product Line

Research Opportunties

- Mercury Control
- PM2.5
- Coal Combustion Byproducts
- Climate Change

Environment Product Line

Research Opportunties

- **Mercury Control**
  - Understanding the chemistry of mercury in coal combustion flue gases
  - Sorbents or systems that capture all forms of mercury at flue gas conditions

Environment Product Line

Research Opportunties

- Mercury Control (Cont'd)
  - Atmospheric conversion chemistry
  - Continuous emission monitors for all forms of mercury
  - Better understanding of bioaccumulation of mercury in fish

Environment Product Line

Research Opportunties

- **PM2.5**
  - **Characterization of ambient PM2.5**
  - **Relationships between sources and receptors of PM2.5**
  - **Primary PM2.5 emissions from coal combustion sources**

Environment Product Line

Research Opportunties

- PM2.5 (Cont'd)

  Epidemiological studies focused on PM2. 5 particles

  Cost-effective PM2.5 control

  - Nitrogen Oxides

Environment Product Line

Research Opportunties

- **Coal Combustion Byproducts**
  - Utilization of carbon associated with flyash
  - Correlations between flyash constituents and construction materials quality
  - Increased uses of CCBs

Environment Product Line

Research Opportunties

- Climate Change (CO_2)
  - Sequestration of CO_2 in coal seams
    - † Mechanisms of CO_2 retention
  - Storage of CO_2 in deep saline reservoirs
    - † Chemistry of CO_2 interactions
    - † Migration of CO_2

Environment Product Line

Research Opportunties

- Climate Change (CO_2)
  - CO_2 hydrate/clathrate formation
  - Enhance natural sinks
  - Optimal CO_2 capture concepts
    - † Integrate with advanced energy conversion systems

FETC CONTACTS

Mercury Control

- **Thomas Brown**
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PM2.5

- **Thomas Feeley**
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FETC CONTACTS

CCBs

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CO2

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